

What is claimed is:

1. An ozone/water mixing apparatus comprising:
a separating vessel structured to contain and degas an ozone/aqueous mixture, the separating vessel including
an off-gas outlet placed and structured to vent undissolved ozone gas from the separating vessel, and
an ozonated water outlet placed and structured to pass the ozone/aqueous mixture from the separating vessel to an application for use;
and
a mixing tower, extending into the separating vessel, the mixing tower including
an inlet portion structured to receive an ozone/aqueous stream, and
an outlet portion structured to pass the ozone/aqueous mixture into the separating vessel.
2. The apparatus of claim 1 wherein the mixing tower inlet portion includes a first inlet structured to receive an aqueous stream and a second inlet structured to receive an gaseous stream containing ozone.
3. The apparatus of claim 2 further comprising an ozone injector connected to the first inlet and the second inlet of the mixing tower.
4. The apparatus of claim 3 wherein the venturi injector comprises an insert element being at least partially located within the mixing tower.

5. The apparatus of claim 1 wherein the mixing tower outlet portion is located within a generally central portion of the separating vessel.

6. The apparatus of claim 1 wherein the mixing tower outlet portion comprises a diffuser element.

7. The apparatus of claim 6 wherein the diffuser element is structured to be effective in reducing surface turbulence in the separating vessel.

8. The apparatus of claim 6 wherein the diffuser element is structured to enhance mixing of the ozone/aqueous mixture passing therethrough.

9. The apparatus of claim 6 wherein the diffuser element includes a plurality of spaced apart, radially disposed apertures for passing the ozone/aqueous mixture from the mixing tower into the separating vessel.

10. The apparatus of claim 1 further comprising a seal mechanism disposed within the separating vessel and structured to substantially prevent liquid water from escaping the off-gas outlet with vented undissolved ozone gas.

11. The apparatus of claim 10 wherein the seal mechanism comprises a float arrangement structured to be effective to control a level of ozonated water in the separating vessel.

12. The apparatus of claim 10 wherein the seal mechanism includes a seal element structured to seal the

off-gas outlet, a float arrangement structured to be effective to control a level of ozonated water in the separating vessel, and a dual lever mechanism connecting the float element with the seal element.

13. The apparatus of claim 12 wherein the seal element comprises an O-ring.

14. The apparatus of claim 12 wherein the dual lever mechanism is structured to provide a substantial mechanical advantage to the seal mechanism.

15. The apparatus of claim 1 further comprising an ozone destruct assembly connected to the off-gas outlet.

16. An ozone/water mixing apparatus comprising:
a separating vessel structured to contain and degas an ozone/aqueous mixture, the separating vessel including
 an off-gas outlet placed and structured to vent undissolved ozone gas from the separating vessel, and
 an ozonated water outlet placed and structured to pass the ozone/aqueous mixture from the separating vessel to an application for use;
and
a seal mechanism disposed within the separating vessel and structured to substantially prevent liquid water from escaping the off-gas outlet with vented undissolved ozone gas.

17. The apparatus of claim 16 wherein the seal mechanism comprises a float arrangement structured to be effective to control a level of ozonated water in the

separating vessel.

18. The apparatus of claim 16 wherein the seal mechanism includes a seal element structured to seal the off-gas outlet, a float arrangement structured to be effective to control a level of ozonated water in the separating vessel, and a dual lever mechanism connecting the float element with the seal element.

19. The apparatus of claim 16 wherein the dual lever mechanism is structured to provide a substantial mechanical advantage to the seal mechanism.

20. The apparatus of claim 16 further comprising an ozone destruct assembly connected to the off-gas outlet.

21. The apparatus of claim 16 wherein the separating vessel includes a portion structured to enable the apparatus to be directly connected to a contact tank.

22. The apparatus of claim 16 wherein the separating vessel includes an upper portion and a lower portion, the upper portion including the off-gas outlet and the lower portion being structured to enable the apparatus to be directly connected to a contact tank.

23. The apparatus of claim 16 further comprising an ozone destruct assembly connected to the off-gas outlet.

24. An ozone destruct apparatus comprising:
an ozone destruct chamber connected to a line for containing an off-gas stream, the ozone destruct chamber being effective in destroying ozone in the off-gas stream as

the stream is passed through the ozone destruct chamber; and a condensate collection chamber structured to collect condensate within the stream of off-gas, the condensate collection chamber including an inlet for receiving the off-gas stream, and an outlet for discharging the off-gas stream to the destruct chamber.

25. The apparatus of claim 24 further comprising a hydrophobic material disposed between the destruct chamber and the condensate collection chamber for substantially preventing liquid water from entering the destruct chamber.

26. The apparatus of claim 24 wherein the condensate collection chamber further includes a drain element for allowing collected condensate to drain from the collection chamber.

27. The apparatus of claim 24 wherein the condensate collection chamber further includes a drain element for allowing collected condensate to drain from the collection chamber to an application for use of the condensate.

28. The apparatus of claim 27 wherein the drain element includes a check valve operable to release the collected condensate when a predetermined condition in the collection chamber is reached.

29. The apparatus of claim 24 wherein the ozone destruct chamber includes a catalyst material effective in destroying ozone.

30. The apparatus of claim 29 wherein the catalyst material comprises activated carbon.

31. The apparatus of claim 29 wherein the catalyst material comprises manganese dioxide.

32. An ozone/water mixing system comprising:
a separating vessel structured to contain and degas an ozone/aqueous mixture, the separating vessel including
 an off-gas outlet placed and structured to vent undissolved ozone gas from the separating vessel, and
 an ozonated water outlet placed and structured to pass the ozone/aqueous mixture from the separating vessel to an application for use;
a mixing tower, extending into the separating vessel, the mixing tower including
 an inlet portion structured to receive an ozone/aqueous stream, and
 an outlet portion structured to pass the ozone/aqueous mixture into the separating vessel;
 an ozone destruct chamber structured to be effective in destroying ozone in the off-gas stream as an ozone-containing off-gas stream is passed through the ozone destruct chamber; and
 a condensate collection chamber structured to collect condensate within an ozone containing off-gas stream, the condensate collection chamber including an inlet connected to the separating vessel off-gas outlet and an outlet for discharging the off-gas stream to the destruct chamber.

33. A system for providing an ozonated water stream to a body of water, the system comprising:
a separating vessel structured to contain and degas an

ozone/aqueous mixture, the separating vessel including
an inlet for receiving an ozone/aqueous
mixture into the separating vessel,

an off-gas outlet placed and structured to
vent an ozone containing off-gas stream from the
separating vessel, and

an ozonated water outlet placed and
structured to pass the ozone/aqueous mixture from
the separating vessel to a main vessel containing
a body of water to be treated;

an ozone destruct chamber structured to be
effective in destroying at least a portion of the ozone in
the ozone containing off-gas stream as the ozone containing
off-gas stream is passed through the ozone destruct chamber;
and

a return line connected to the ozone destruct chamber
and placed and structured to pass the off-gas stream from
the ozone destruct chamber and into the main vessel
containing the body of water.